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On tariff elimination, trade harmonization, and household well-being: A study of the GST rollout in India

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Abstract

The transformative research agenda encourages the pursuit of questions emphasizing societal welfare and well-being outcomes rather than (just) focusing on narrow, incremental business-related outcomes. This paper addresses that premise by examining those households at the social and economic bottom of the pyramid (BOP) that are intended to benefit most from the removal of trade barriers. The removal of these barriers should enable supply chains to yield commercial and welfare efficiency in terms of economic surpluses. The Goods and Services Tax legislation implemented in India in 2017 sought to do just that, serving as the experimental testbed for our investigation. Yet, as our analysis of more than 50,000 unique households in the Consumer Pyramids Household Survey data indicates, those at the social and geographic BOP see less benefit than others from the same policy intervention. This runs counter to the intended consequences of such policies. We employ a middle-range theorizing approach grounded in the Theory of Customs Unions to inform and substantiate our hypotheses, which are tested using a stochastic frontier analysis and truncated regression. The results hold implications for policymakers and organizations seeking to elevate the efficacy of supply chains orchestrated by and serving BOP populations.

KEYWORDS

bottom of the pyramid, middle range theory, trade barriers, trade harmonization, transformative research

INTRODUCTION

While the traditional emphasis of business research has been on assessing the financial gains accrued to companies because of their activities, Bowersox (1998, p. 2) argued that "the logistical mission of yesterday is being replaced by a broader concept driven by social responsibility," thereby alluding to the idea that academia needed to look not just at "traditional" firm performance measures but also at broader, social outcomes. In the past few years, there has been increased recognition of the expanded role that businesses fulfill in enhancing quality-of-life outcomes, employing broader stakeholder analyses of supply chain performance, and including aspects that may not necessarily be considered "business-related" in the most classical sense (e.g., Kalkanci et al., 2019; Rao et al., 2019; Sodhi & Knuckles, 2021; Sodhi & Tang, 2016). This evolving perspective, philosophically, aligns with the *transformative research framework*, that emphasizes societal welfare and encourages researchers to address issues relevant to humanity and societal well-being (Crockett et al., 2013; Mick et al., 2012).

A significant portion of this research stream (especially recently) has focused on the poorest and most

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underserved segments of the global community – a group that often lacks access to essential goods and services and is sometimes referred to as the "Bottom of the Pyramid" (BOP) (Iyengar et al., 2021). This research typically takes the viewpoint that working with the BOP is likely to result in opportunities for mutual value creation – that it may not only be good for business but also for the communities (and individuals) that are thereby involved (Dembek & Sivasubramaniam, 2019; Khalid & Seuring, 2019; London et al., 2010). Fostering economic and family well-being at the BOP is, therefore, a two-way street in that it can benefit both the recipient and provider (c.f., Sodhi & Tang, 2016). BOP researchers have investigated outcomes related to hunger reduction (Levi et al., 2020), poverty alleviation (Blocker et al., 2013), sustainability (Prothero et al., 2011), general health (Anderson et al., 2018), and family welfare (Nilakantan et al., 2019).

Under the broader transformative research agenda, Mollenkopf et al. (2020) examined the role of supply chain ecosystems towards enabling the safe provision of food during a pandemic, the goal of which was ensuring the health and safety of employees and customers as a well-being outcome. Similarly, Nilakantan et al. (2019) investigated the extent of embeddedness that small supply chain operators had in their community and how that may influence the surplus they can generate for their families. Esper et al. (2020) addressed the role of SCM scholarship in confronting the civil unrest of 2020 by calling attention to the need for academic research that explores supply chain responsibilities in confronting racism. Our current study is inspired by this prior work.

Further, our study is also guided by the recognition that around the world, policymakers introduce regulatory changes from time to time, many of which are aimed at improving the lives of their constituents (Okoro et al., 2020). Yet, how these changes impact those at the bottom of the global socioeconomic ladder is not well understood. For example, consider Tanzania's "*Doing Business*" reform program. This program was designed to reduce red tape, decrease policy uncertainty, and ease access to credit. Yet, while overall GDP did rise considerably in the first ten years following implementation, the program *did not* reduce poverty, improve living conditions among the rural and downtrodden, or create many BOP jobs, and little is known regarding the reasons for this failure (c.f., Dalglish & Tonelli, 2016). Within the realm of policy introductions, changes related to tariff harmonization and trade barriers carry significant consequences for supply chains affected by such policy shifts. Tax laws spanning various regions, whether they pertain to different states or provinces within a country or extend across nations, have the potential to influence critical decisions in supply chain and logistics, including sourcing, customer targeting, and facility establishment. These changes, in turn, can impact societal welfare. Given this focus of our study concerning policy and BOP household welfare, we seek to answer the following question: *To what extent does the reduction of trade barriers through tariff harmonization influence the household welfare efficiency of the socio-economically weakest in a society (i.e., those at the bottom of the pyramid)*? In our analysis, household welfare efficiency (HWE) measures how efficiently households convert their endowments of labor, financial capital, and human capital into consumption of goods and services, indicating their economic well-being relative to others.

Following the guidance of Mollenkopf et al. (2020, p. 190), who indicated that future research "should explore the applicability of the transformative service lens to other (i.e., non-western) societies," we focus on the Indian BOP context and the implementation of a specific piece of legislation aimed at streamlining the supply chain through trade barrier reduction, the introduction of the Goods and Services Tax (i.e., GST – introduced in 2017). The Indian BOP context offers a compelling test bed for our investigation due to its substantial dependence on the informal economy and BOP businesses. This environment is characterized by numerous micro- and, even, nano-entrepreneurs, exemplified by mom-and-pop retail stores commonly known as "kiranas," as well as small-scale producers.

Furthermore, the implications of GST go beyond the realm of general tariff adjustments. The primary aim of GST was to streamline supply chains by eliminating inter-state taxes. More pointedly, it sought to formalize supply chains by encouraging businesses to register within the framework, providing them with tax incentives. These incentives extend not only to individual organizations but also to the compliance of upstream supply chain partners. In this regard, GST emerged not only as a tariff harmonization law but also a supply chain policy, profoundly transforming the operational landscape of Indian businesses. Additionally, GST's emphasis on formalization had significant repercussions for the informal sector, a crucial component of the Indian economy integral to the welfare of the BOP population.

Our study delves into the differential impacts of GST on the well-being of BOP households by investigating hypotheses formulated with top-down middle-range theorizing (MRT) and the Theory of Customs Unions (TCU) as a basis. The hypotheses are tested with a sample of 214,407 household-level observations across rural and urban parts of India spanning four occasions – i.e., *three before the change in the regulatory environment*

(i.e., 2015, 2016, and 2017) and *one after the change* (i.e., 2018). We apply a stochastic frontier analysis and a hierarchical truncated regression analysis to identify the impact of the change in policy on the economic well-being of socially and geographically disadvantaged households. The reason we focus on household welfare rather than businesses income, is that at the BOP, business well-being and household well-being are often seen as being highly correlated with each other (Dorathy, 2015; Nilakantan et al., 2021). Therefore, HWE provides a more robust measure of overall economic well-being, in addition to being congruent with the guiding philosophy behind transformative research which argues for increased scholarly focus on welfare-type measures. We continue by establishing the conceptual foundation for the current investigation.

CONCEPTUAL FOUNDATION

Because our study focuses on the impact of trade barrier reduction, it is important for us to appropriately position our study in the underlying literature bases spanning trade barriers and how they may impact SCM. Additionally, discuss our specific research contexts that lend themselves to an investigation of the phenomenon of interest. We discuss these below.

Trade barriers, tariffs, and supply chains

Trade barriers refer to any restriction on the free flow of goods and services between entities (Lee & Swagel, 1997). These barriers can take many forms, including tariffs, quotas, and (other) regulations (c.f., Prataviera et al., 2020), and are often drawn up through legislative action. Such barriers may be organic (i.e., where the specific aim of the action is to create a barrier), or inorganic (i.e., where the aim is not necessarily to create a barrier, but said barrier gets created as a byproduct of the action). Because tariffs are among the most common types of trade barriers (Calvo Pardo et al., 2009) and are the issue of most relevance to our current study, that is the trade barrier we discuss below. Indeed, recognizing the importance of tariffs in SCM, recent publications in the *Journal of Business Logistics* have either focused on these tariff-related issues (e.g., Norrman & Prataviera, 2023; Pellegrino et al., 2023; Prataviera et al., 2020) or called for more scholarship on the same (Zinn & Goldsby, 2020).

Tariffs are taxes imposed on items (typically, items originating in a different geographic area) that raise the final landed price for consumers. In addition to providing income for the legislative body imposing them, the second purpose of tariffs often is to make certain goods (i.e., typically, those originating in a different geography) more expensive than others (e.g., domestic), thus making the latter more attractive to buyers. Because of this pricing and market-manipulation power, tariffs therefore can influence a lot of supply chain functions (Dong & Kouvelis, 2020; Rogers et al., 2024). For example, it has been argued that in modern supply chains, tariffs can influence the location of production facilities, distribution, and inventory, as well as introduce uncertainty that elevates the risks in strategic decision-making (Zinn & Goldsby, 2020). Consider, for example, how Harley Davidson shifted away from a centralized US-based network component facilities to a regionalized U.S. and Europe-specific supply chain in 2018 in response to the steel import tariffs imposed by the Trump administration (Rappeport, 2018). Similarly, Grossman and Helpman (2020) identified that in response to the tariffs imposed by the Trump administration on Chinese goods, several large firms including *Samsonite, Cisco, Macy's and Ingersoll-Rand* started realigning their product sourcing almost immediately.

At a broader level, Baldwin and Seghezza (1998) explore the implications of trade barrier reduction on the growth of developing nations and find that it has direct effects on integration-induced productivity growth. Similarly, Farhi and Werning (2017) discuss tariff harmonization as a type of fiscal union, subsequently suggesting that such unions are effective risk-sharing arrangements that help in providing macroeconomic stabilization across regions. Alesina et al. (2000), while not specifically looking at tariff reduction, argued that the degree of "openness to trade" is an important predictor of how a country's size is related to its economic progress over time – thereby alluding to the idea that reducing of trade barriers (which, as we have argued, is what tariffs directly influence) is important to accelerating economic achievement. For a detailed treatise on the relation between tariffs, economic growth, and the critical role that supply chains can play therein, we refer interested readers to Grossman and Helpman (2020) or Dong and Kouvelis (2020).

In the current study, we are interested in how the elimination of a tariff regime may impact welfare at the BOP. Specifically, as we have mentioned before, we are interested in the welfare efficiency of BOP households after the introduction of legislation that sought to harmonize tariffs in India, specifically the introduction of the Goods and Services Tax (GST). This is in part inspired by recent calls (e.g., Dong & Kouvelis, 2020, p. 26) which have argued that "there are still growing issues to be captured in our work if we want to more effectively deal with the systematic and global supply chain impact of such phenomena (e.g., tariffs) in complex, multiproduct, multi-stage supply chains."

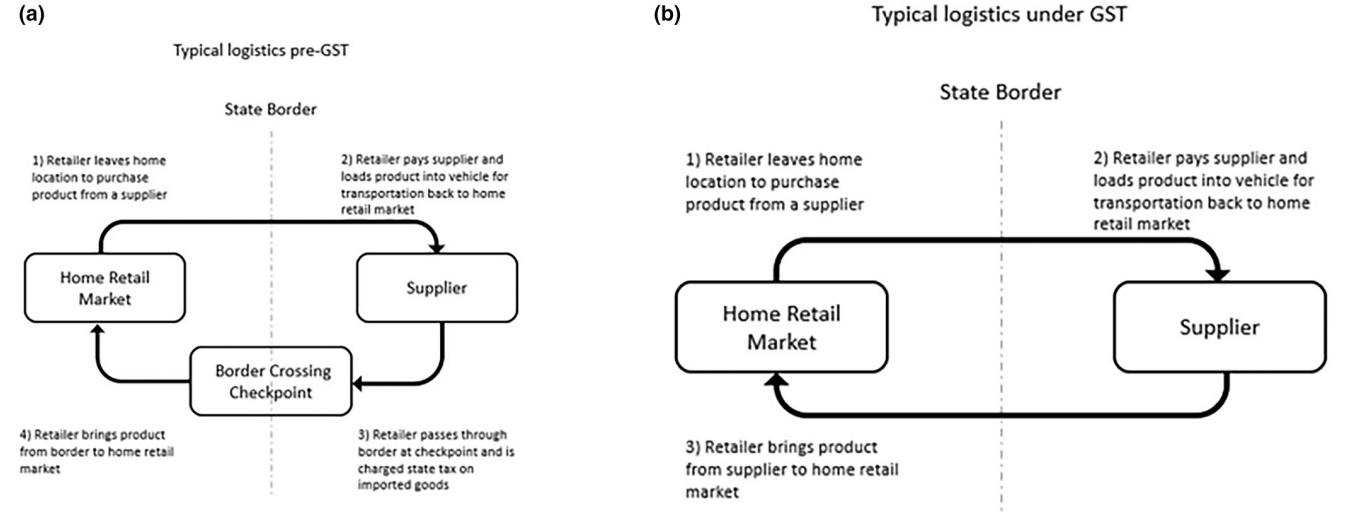
(a)
Typical logistics pre-GST
State Border
1) Retailer leaves home location to purchase product from a supplier
2) Retailer pays supplier and loads product into vehicle for transportation back to home retail market
Home Retail Market
Supplier
Border Crossing Checkpoint
4) Retailer brings product from border to home retail market
3) Retailer passes through border at checkpoint and is charged state tax on imported goods
(b)
Typical logistics under GST
State Border
1) Retailer leaves home location to purchase product from a supplier
2) Retailer pays supplier and loads product into vehicle for transportation back to home retail market
Home Retail Market
Supplier
3) Retailer brings product from supplier to home retail market

FIGURE 1 Logistics before and under Goods and Services Tax (GST). (a) Typical logistics Pre-GST. (b) Typical logistics under GST.

Research context – goods and services tax legislation of 2017

On July 1, 2017, the Government of India (GOI) adopted the GST throughout the country. GST is an indirect tax on the supply of goods and services from the manufacturer to the consumer and is administered by the central government. Specifically, credits of input taxes paid at each stage are available in the subsequent stage of value addition, which makes GST essentially a tax only on the *value addition* at each stage (GOI, 2022b). GST, therefore, ensures that indirect tax rates and structures are harmonized across the country, thereby increasing certainty and ease of doing business. As outlined by the Indian government, the GST is a unifying tax aimed to bring the country together under the policy of "One country, One tax, One market." Prime Minister Narendra Modi hailed the initiative as a "good and simple tax," and it was met with great enthusiasm and fanfare by the Indian Parliament (Sengupta, 2017).

Prior to the adoption of GST, the Central and State Governments administered 17 different indirect taxes levied separately and at different rates, even for the same commodity, creating huge compliance burdens as well as cascading taxes (i.e., paying taxes on taxes; Majumder, 2019). The implications of this disparate indirect tax system in India were vertical and horizontal fiscal imbalances as well as penalization of goods and services traded across state geographic boundaries due to high transaction costs (Mukherjee, 2020), and the inability to take credit for central sales tax on inter-state sales (Majumder, 2019). Particularly severely affected were transactions crossing state lines. It has been suggested that the result of the varying tax rates collected was predominantly negative for trade, when compared to post-introduction of the GST (Van Leemput & Wiencek, 2017).

Instead, under GST, the states have relinquished their ability to levy additional taxes beyond that of the GST, with the exception of a few products such as alcohol and petroleum products that are outside of the GST system (GOI, 2022a). As such, tax revenues at the state level are fixed at a percentage of the GST that is shared with the states, and no further taxes are allowed to be put into effect (GOI, 2022a). For example, a typical flow of goods in the pre-GST era meant retailers and manufacturers needing products across state borders would be subject to multiple taxes, see Figure 1 for an illustration of a typical product-flow pipeline under pre- and post-implementation of GST. Before GST, each state that a vehicle passed through could (and usually would) require a tax, known as entry tax or *octroi*, in addition to the levy of central sales tax by the Central Government, resulting in taxes being paid multiple times on the same product as it moved across the country. No credit was available for these taxes on inter-state sales, creating a cascade of paying taxes on taxes. Upon implementation of GST, these separate cascading taxes were abolished.

The GST structure, therefore, not only streamlined the Indian tax system but also sought to simplify and improve the supply chain and distribution systems in the country, especially across state lines (Kashyap, 2017). Checkpoints run by individual states or local governments to collect taxes and *octroi* were shut down, cutting wait times and allowing traffic to move more quickly. For example, within weeks of GST taking effect, travel times were down 20% for long-haul trucks (The Economic Times, 2017). Additionally, the digital tax process brought forth with GST now allows businesses to complete registration, submission, and payments

online, reducing compliance costs and infusing transparency into the taxation process. Equally importantly, because GST is a *value added tax*, in that sellers of goods are only taxed on the value that is added at their stage in the supply chain, it creates a significant disincentive for businesses to procure goods and services from unregistered / informal entities.

Consider, for example, a business entity selling an item at $X in the marketplace, out of which $Y was the input cost. Under GST, the business entity would only be taxed on the (X-Y) amount, provided they had a documentation of the procured raw materials. If, however, they did not have such documentation, they would be taxed on the entire amount (i.e., X). This effectively creates a system whereby businesses are heavily disincentivized from buying from unregistered / informal sources that were not traceable or fell outside of the formal tax network. Because historically most BOP businesses fell into such categories (e.g., De Soto, 2000; Dorathy, 2015; Heltberg & Lund, 2009; Okoro et al., 2020), GST has had a major impact on such businesses in that it effectively necessitates them to become registered and formalized, thereby bringing them into the tax network, and allowing them to participate in wider marketplace supply networks to the fullest possible extent. Post GST, for example, a small rural retailer or manufacturer would be on the same footing as any other similar business in terms of competing for a buyer's business, at least from a tariff harmonization standpoint. Indeed, according to trade reports, over 10 million businesses applied for a GST registration in the first-year post GST, with nearly 40% of them being first-time tax ID applicants that were hitherto unregistered (Economic Times of India, 2018).

Research context – Nanostores and the BOP economy in India

Analysis of BOP supply chains in India calls for a brief explanation to provide proper context. India is the second largest nation in population, yet its economy differs from other developing countries in two important ways. For one, even though the nation hosts some of the largest cities in the world (Mumbai, Delhi, Bangalore, and Hyderabad all with populations in excess of 7 million people and another 40 cities with populations of a million or more), the majority of people (69%) live outside metropolitan areas (Plasman et al., 2017). The second key feature for the sake of supply chain analysis is that the preponderance (80%) of fast-moving consumer goods is sold through nanostores, or traditional mom-and-pop shops known as “kiranas” in India (Pinto, 2023). It is estimated that the number of kiranas in India exceeded 13 million establishments and rising in 2022 (Minhas, 2023). Further, India is the seventh largest nation in land area, covering almost 1.3 million square miles. Supply chain professionals recognize the challenge in serving such a mindboggling number of outlets efficiently over a vast geography.

In their in-depth analysis of nanostores around the world, Fransoo et al. (2017) expose the supply chain challenges facing nanostores as well as the consumer packaged goods (CPG) companies that serve them. Kiranas are high-velocity businesses out of necessity. They have small footprints of less than 500 square feet, typically, allowing limited space for on-shelf inventory and virtually none for extra stock (Sinha et al., 2015). Despite the small footprint, kiranas might stock between 1000 and 8000 SKUs and function like full-service supermarkets, with many offering home delivery services. Kiranas in urban areas hold 30–45 days of inventory and restock every 8–10 days (Plasman et al., 2017). They also operate light on cash, preventing them from taking on greater space and supplies. Kiranas tend to issue credit to consumers, allowing shoppers to buy on credit on a weekly or monthly basis (Mishra, 2023) even though CPG companies typically do not issue credit to small shopkeepers, making cash position the greatest challenge to these operators (Plasman et al., 2017).

Said to be India's “economic backbone” (Mishra, 2023), kiranas perform an essential function throughout the nation. This statement is especially true in small towns and rural areas in India where merchants, themselves, might travel considerable distances to replenish stocks in order to provide consumers with vital access to affordable products (Escamilla et al., 2021). The implementation of GST had extensive implications for kiranas. While GST aimed to integrate informal kiranas into the formal commercial network and encourage the adoption of digital solutions for improved customer engagement, supply management, and billing efficiency, it introduced complexities for these establishments (Kapuria & Nalawade, 2021). Challenges such as limited access to digital tools, compliance burdens, and the inability to source products from other informal businesses outside the GST framework disrupted retail operations for kiranas nationwide.

Though kiranas do not represent the entirety of small business enterprises in India, they are representative of the microentrepreneurs instrumental in serving the immense consumer market (Iyengar et al., 2021). GST brought about monumental changes impacting various stakeholders, including kiranas and other microentrepreneurs. We continue by examining how the design of GST was to remove barriers in trade for all participants in the Indian economy, including those in the BOP.

THEORETICAL BACKGROUND AND HYPOTHESES

We employ a top-down middle-range theorizing (MRT) approach which allows us to derive theoretical insights from extant theories and substantiate them with context-specific (i.e., BOP) data (Craighead et al., 2016). We begin by leveraging *regional integration* literature, particularly the Theory of Customs Unions (TCU) (Lipsey, 1992), a well-established framework to understand the economic implications of harmonizing tariffs across regions. However, we acknowledge the distinctive characteristics and complexities unique to the BOP setting (especially Indian BOP) concerning the GST phenomenon. To address these context-specific insights, we then adopt a MRT approach to delve into the intricacies and explore the multifaceted effects of tariff harmonization on various socio-economic strata within the country.

Theory of customs unions

While there are competing definitions of the term "regional integration," (c.f., Schneider, 2017), one commonly accepted definition is that it refers to a process of "change from relative heterogeneity and lack of cooperation, towards increased cooperation, integration, convergence, coherence and identity in a variety of fields such as culture, security, economic development and politics, within a given geographical space" (Schulz et al., 2001, p. 5). Such research generally falls under the purview of *economic geography* – a discipline that draws inspiration from the observation that human activities and development are unevenly spread out over space (Krugman, 1991; Mulligan, 1984). Specifically, it is suggested that economic development may often be agglomerated into "clusters," and therefore, even when factors of economic production or distribution are "branched out," (i.e., harmonized) economic activity may still follow relatively non-uniform geographic patterns (Mulligan et al., 2012; Patidar et al., 2022). Prior scholarship in supply chain management has explored issues at this interface of economics and logistics through the lens of regional integration (e.g., Bolumole et al., 2015; Golicic & Sebastiao, 2011; Patidar et al., 2022).

Within the regional integration domain, the current paper involves a contextual adoption of TCU (Lipsey, 1992). A customs union is a type of trade agreement in which participating entities agree to eliminate tariffs and other trade barriers on goods traded among themselves. TCU proposes that by eliminating tariffs among member entities, trade between them will increase, leading to economic benefits for participants (Bickel, 2021). While originally intended as a theory to explain trade and welfare effects of tariff streamlining *across countries*, the theory is broadly applicable in most types of geographic spaces where friction May have previously existed between entities as far as the movement of goods and services is concerned (Blejer, 2019). The introduction of GST, as we discussed previously, matches this definition of a customs union even though it is *within* one country rather than *across* countries. Additionally, recall that our key research question focuses on welfare efficiency – a dependent variable that has been often investigated using the lens of TCU, and is sometimes seen as central to its development (e.g., El Alaoui & Omari, 2022; Mandal, 2019). Therefore, we contend that this context provides an appropriate ground for the application of TCU.

As per TCU, when geographic entities enter a customs union, two fundamental effects may occur. The first involves a change in the location of where products are sourced. Specifically, it is argued that because the creation of such customs unions reduces trade barriers and the associated friction in commerce, individuals or businesses may now be able to move their *sourcing* of goods and services from relatively higher cost domestic (i.e., internal) sources to relatively lower cost foreign (i.e., external) sources (Johnson, 2017). Conceptually this derives from the principles of transaction cost economics in that members of the now new economic region will face lower transaction costs in goods and factor movements among themselves than in transactions with non-members (which they would have faced previously; Langhammer, 1992, p. 211). As we have discussed before, this is exactly what can happen in the post GST regime owing to the reduction in friction when goods are moved across state lines (see Figure 1). At the same time, it is argued that individuals and businesses may also be able to change the location of *production* itself from relatively higher cost but geographically proximate sources to relatively lower cost sources that may have previously been considered foreign source outside the customs union (Kowalczyk, 1990). The former effect is termed *trade diversion*, while the latter is termed *trade creation*. Both these effects have important implications for welfare (c.f., Mandal, 2019; Sheer, 1981).

While trade creation raises welfare both in the short as well as long term, trade diversion may, in some cases, raise or lower welfare long term, depending on the circumstances (Kowalczyk, 1990). In the short term, however, there is consensus that trade diversion may also be beneficial for welfare (c.f., Ganesh-Kumar & Chatterjee, 2016; Jha, 2013). For example, the Kemp-Wan proposition argues that so long as the imports from entities *outside* the

customs union (sometimes called the "rest of the world[1]") remain relatively unchanged after the formation of the union, the union formation will be welfare-enhancing in terms of both trade diversion as well as trade creation (Kemp & Wan Jr., 1976). Because such imports from outside the customs union do not materialize overnight and are unlikely to change immediately after the formation of the union *ceteris-paribus*, it stands to reason that at least in the short term, small-scale entrepreneurs, will benefit from the trade barrier elimination.

From an MRT standpoint, extant literature has also established that income and household welfare are directly connected at the BOP, and that changes in the former will be immediately evident in the latter, in terms of changes in consumption patterns (Dorathy, 2015; Heltberg & Lund, 2009). Trade harmonization introduced by GST was designed to reduce the friction of trade. Per our earlier discussion, kirana shop owners should, on average, be able to acquire supplies from distant (i.e., out-of-state) sources for less in a post-GST environment. Therefore, we propose testing the core mechanism derived from TCU, but guided by MRT, as our first hypothesis. We propose that the effect will be visible on the associated *households* and their *welfare* therein. Our first hypothesis is, therefore, stated as follows:

> **H1.** Relaxation of trade barriers through tariff harmonization is associated with a significant increase in household welfare efficiency.

While TCU provides a solid theoretical foundation to explain the core phenomenon, following the guidelines of MRT, we acknowledge the importance of considering various context-specific factors in our study. One such factor is the tariff harmonization that occurs within a single country, rather than between different countries. The introduction of the GST in India had broad implications for businesses operating across various industry sectors and supply chain echelons. However, India's business landscape exhibits a unique amalgamation of both formal and informal sectors, presenting a distinct set of challenges and opportunities when examining the implications of the GST, particularly at the BOP level. A significant impact of the GST's introduction in India was the requirement for firms to obtain tax receipts from their suppliers. This enabled them to claim input tax credits (ITC), which refers to a reduction in the tax paid on output, equivalent to the tax already paid by previous rungs in the supply chain (Unni, 2018). While this change aimed to streamline the tariff system and promote trade, it had significant repercussions for firms operating in the informal BOP sector, as these businesses were historically operating outside the tax net (Saikia, 2018).

Admittedly, GST registration was not required for small, informal businesses at the BOP with an annual turnover of less than 2 million rupees i.e., approximately 24,000 USD (Pandey, 2020). However, this exemption deterred their partnerships with formal sector entities since formal sector businesses could not claim tax credits from partnerships with unregistered BOP businesses. Therefore, this disincentive led formal sector partners to shift their sourcing to other supplier firms registered with tax authorities, allowing them to claim ITCs and reduce overall tax liabilities (Unni, 2018). Over time, this change in procurement methods augmented the formal sector's preference for registered suppliers (Kashyap, 2017). As a result, informal BOP entities were either pushed to formalize or progressively excluded from the supply chain (Rajshekhar, 2017). Considering TCU, H1 broadly explains how GST enabled household welfare efficiency, but the aforementioned practical considerations highlight why this welfare translation may not adequately apply to the BOP. In light of these specific nuances inherent to the context of our study, we explore the impact of tariff harmonization on two particular groups of BOP households – Social BOP (SBOP) and Geographic BOP (GBOP).

Our classification of SBOP is grounded in a household's social status, a term often equated with *caste* in the Indian context, which significantly impacts household welfare (Chrispal et al., 2021; Nafziger & Terrell, 1996). The caste system in India typically divides people into a social hierarchy, with *Brahmins* (i.e., teachers) at the top and *Sudras* (i.e., peasants and artisans) at the bottom, with access to opportunities and social engagement directly proportional to the level of a person's caste (Bapuji & Chrispal, 2020). Although such ethically questionable systems exist globally, the Indian caste system has unique implications due to its historical roots (Bapuji & Chrispal, 2020). Given that the Indian caste system originally stemmed from household occupations, many families were forced to maintain their caste-associated professions across generations. Especially for households from lower castes, there has been a struggle to escape these confines and join the formal economy (Chrispal et al., 2021; Kabeer, 2000). These communities' historic marginalization continues to keep them on the sidelines of rapid economic growth even

[1]While researchers use the term "rest of the world" when discussing TCU, the term need not necessarily truly refer to the *rest of the world* in the sense of *other countries*. In this case, the term the *rest of the word* just means entities *outside* of the customs union, even if they are within the same country. For example, if a hypothetical country had five states (i.e., 1–5) and the first four were in the union but the fifth was not, the fifth state in this case would also be a part of the "rest of the world" for the purposes of the modeling the propositions in question.

as India experiences one of the world's fastest-growing economies, with such communities continuing to face challenges in being accepted as equals in the community (Bapuji et al., 2023; Soundararajan et al., 2023).

As posited in our initial hypothesis, we believe that the relaxation of trade barriers through tariff harmonization raises potential welfare for all households. However, a household's ability to tap this increased potential welfare i.e., convert it into *actual* realized welfare gains depends on the level of its access to the enhanced economic opportunities. We argue that a common policy can have differential effects on different groups based on preexisting group differences in access to opportunities. SBOP households are deeply embedded in the informal sector (Bapuji et al., 2023; Chrispal et al., 2021), which, as previously mentioned, has experienced adverse consequences following the implementation of GST. Moreover, the discrimination and marginalization faced by those at the SBOP impedes their mobility and creates challenges in adapting to GST-induced changes such as trade creation and trade diversion (Soundararajan et al., 2023). Additionally, this marginalization limits the structural embeddedness of SBOP communities, i.e., the extent to which they are integrated into the established social, economic, and institutional structures of a society (Iyengar et al., 2021). Therefore, this reduces their capacity to fully leverage the greater benefits intended by GST. Hence, we argue that households belonging to SBOP face lower realized welfare increases. This leads us to our second hypothesis.

> **H2.** The increase in household welfare efficiency through tariff harmonization is lower for those belonging to socially disadvantaged groups (i.e., the social BOP [SBOP]) than those not belonging to socially disadvantaged groups.

The secondary distinction of BOP is based on the geographic region (GBOP), notably emphasizing the pronounced developmental gap between rural and urban areas. This is especially true in the context of India, where 65% of the total population still resides in rural areas and is largely true for most emerging economies which hold relatively larger rural masses compared to urban ones (Rosca et al., 2020). Rural population in India are plagued with several institutional challenges such as deficient infrastructure, restricted access to quality education and technology, and a relatively lax governmental oversight (Nilakantan et al., 2021; Sodhi & Tang, 2016). Additionally, challenges such as escalating inflation (Paul & Sharma, 2019), rural-to-urban dislocation (Chakrabarti & Saha, 2019), inadequate social protection (Raghunathan et al., 2021), and restricted access to financial instruments (Iyengar et al., 2021) underscore the multifaceted obstacles faced by rural communities.

These pre-existing disparities can affect the rural households' capabilities to tap into the increased potential welfare brought forth by implementation of policies (Soundararajan et al., 2023). For instance, lack of education, information, and awareness regarding policy and compliance changes places rural businesses at a distinct disadvantage when attempting to align with the practices mandated by the GST framework. Similarly, the absence of accessible financial instruments further impedes the ability to undertake the necessary risks associated with incorporating trade creation and trade diversion practices necessitated by the post-GST environment. Moreover, GST's emphasis on modernization further exacerbates the divide, as rural businesses tend to lag in technological adaptation. It should also be noted that over the last few decades, the predominance of agriculture in the rural economy has diminished significantly with about two thirds of rural income now being generated through nonagricultural activities (Aayog, 2017). This indicates a growing reliance on informal business sector, which is markedly more prevalent in rural regions compared to their urban counterparts (ILO, 2019). Consequently, the transition mandated by the GST, designed to formalize businesses, poses distinctive challenges for rural economies heavily reliant on these informal practices. Given these disparities, we argue that households belonging to GBOP face lower realized welfare increases. This leads us to our third hypothesis.

> **H3.** The increase in household welfare efficiency through tariff harmonization is lower for those belonging to geographically disadvantaged groups (i.e., the geographic BOP [GBOP]) than those not belonging to geographically disadvantaged groups.

Though the second and third hypotheses independently explore social and geographical BOP dimensions, it is crucial to acknowledge the intertwining nature of these two facets, particularly when considering transformative research perspectives (Iyengar et al., 2021). For instance, in India – as is true for many societies – the levels of education and awareness often reduce social discrimination in urban regions. However, rural India experiences a distinct manifestation of the caste system, with a more pronounced social hierarchy and associated stigma (Bapuji & Chrispal, 2020; Chrispal et al., 2021; Soundararajan et al., 2023). Importantly, caste dynamics play a pivotal role in shaping power structures and poverty in rural areas, thereby influencing access to resources, economic mobility, and overall well-being of marginalized communities

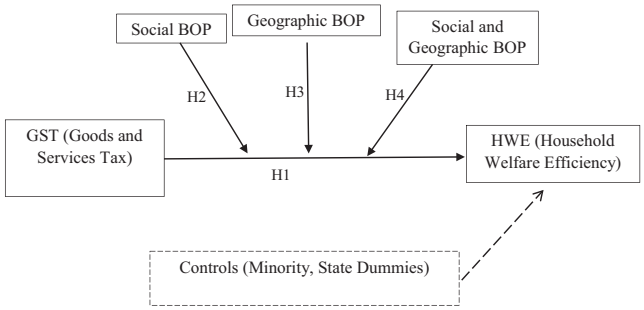

FIGURE 2 Research model.

(Dasgupta & Pal, 2021; Johnson & Karlberg, 2005). Policy implementation in rural India also reflects disparities related to caste. For example, researchers have identified unequal outcomes in the execution of India's national rural electrification program, particularly affecting low caste/marginalized communities (Aklin et al., 2021).

It is therefore conceivable that this intersectionality of geographic location and social standing may significantly shape the opportunities and challenges that individuals and households tend to face at the BOP. Consequently, an argument can be posited that the adverse effects of the SBOP and GBOP standing of a household are more pronounced when considered *together*, rather than in isolation. Hence, we propose our fourth hypothesis as follows.

> **H4.** The increase in household welfare efficiency through tariff harmonization is lower for those belonging to the intersection of SBOP and GBOP than those not belonging to this intersection.

The overall proposed research model is presented in Figure 2.

STUDY DESIGN AND DATA COLLECTION

The data in this study come from the Consumer Pyramids Household Survey (CPHS), which is administered on a panel of households by the Centre for Monitoring Indian Economy (CMIE). The study, originating in 2014, is considered nationally representative and has covered over 236,000 households over the years (Bhattacharya & Sinha, 2021; Vyas, 2020b). In addition, it has probability-proportional representation from over 90% of the districts in the country and reports a response rate of approximately 84%. Prior researchers have used this data to study labor market participation and job losses (e.g., Mamgain, 2021; Mishra et al., 2022), household consumption (Wadhwa, 2019), and healthcare (Mohanan et al., 2021).

CPHS relies on direct, face-to-face interviews with respondents, and, except for months when lockdowns were enforced, respondents were met face to face (in the months when the country was under COVID-19 imposed lockdowns; however, surveys were administered telephonically; Vyas, 2020a). Surveys are conducted by field teams who are engaged by CMIE on a full-time basis. These teams personally visit the households that are in the CPHS panel to conduct the interviews. Every household in the panel is visited three times a year according to a fixed schedule. Interviews are conducted such that answers provided by the respondents during the visit to the household are captured directly into an Android-enabled communication device using a secure and specially developed application. A corporate team (independent of the field team) geotags the location of the Android device to ensure it matches the address of the respondent that was supposed to be interviewed (Vyas, 2020b).

Survey responses are categorized into four different databases, all of which are used in this paper. Specifically, these include the following. (i) *People of India* – This database captures attributes of Indian people such as identity, employment, time-use, health, and finance. (ii) *Aspirational India* – This database provides snapshots of household wealth, wants, comforts and perceptions by capturing assets, investments, debts, amenities, and sentiment data. (iii) *Income Pyramids* – This database presents a monthly time series of the income of sample households and its composition by sources. (iv) *Consumption Pyramids* – This database provides a detailed breakdown of the monthly consumption expenses of households. It contains data on food and non-food expenses, including clothing, footwear, cosmetics, toiletries, appliances, restaurants, utilities, transport, communication, education, health, loan payments, and other miscellaneous expenses (CPHS, 2021). The data collection and reporting protocol are presented in Figure 3.

Constructs used

Our study is interested in identifying the change in household welfare efficiency for SBOP and GBOP households before and during the GST regime. Therefore, we needed to use attributes across all four databases over a four-year period. The years 2015 through 2017, consisting of three years of data covers the pre-GST regime period, and the year 2018 covers the post GST regime period. We do not include the periods 2019 through 2021 since our results would have been confounded by the effects of the COVID-19 pandemic. The respondent pool included 65,840, 61,931, 64,967, and 66,667 households from 2015 through 2018, respectively,

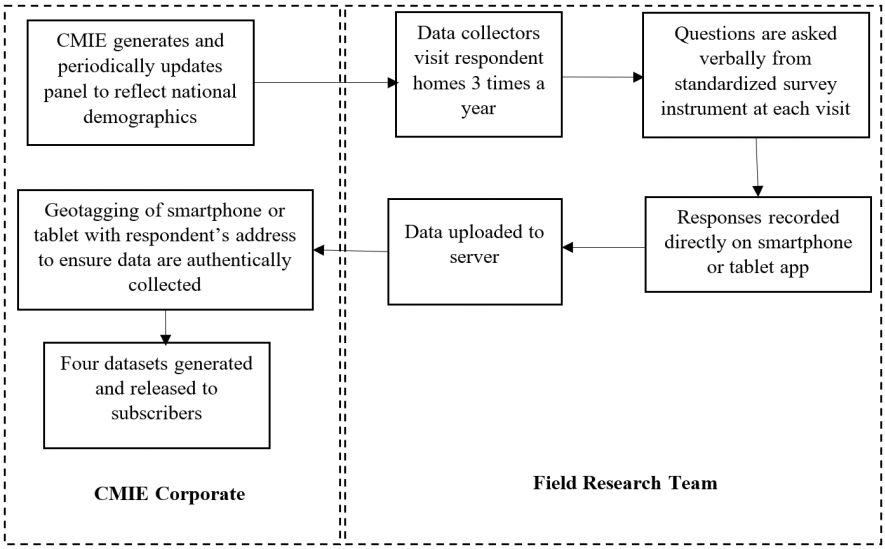
CMIE generates and periodically updates panel to reflect national demographics
Data collectors visit respondent homes 3 times a year
Questions are asked verbally from standardized survey instrument at each visit
Responses recorded directly on smartphone or tablet app
Data uploaded to server
Geotagging of smartphone or tablet with respondent's address to ensure data are authentically collected
Four datasets generated and released to subscribers
CMIE Corporate
Field Research Team

FIGURE 3 Centre for Monitoring Indian Economy (CMIE) data collection and reporting protocol.

amounting to 259,405 observations in total (most households appear in multiple years, so these are not distinct observations). We subsequently dropped households that did not appear in at least 2 years given our interest in computing time varying efficiency levels. This left us with 51,387, 55,093, 56,828, and 51,099 households from 2015 through 2018, respectively, amounting to 214,407 households in total, comprising an unbalanced panel. This is the sample size (i.e., "*N*") in the current study.

Recall that our hypotheses involve a measure of efficiency (i.e., household welfare efficiency). We therefore need to generate the efficiency scores by performing a stochastic frontier analysis (SFA) to fit a *production frontier* and compute the efficiency of households relative to that frontier. The production frontier defines the maximum consumption of goods and services (household welfare) that can be attained given the labor, capital, and human capital endowments of the household. We then use the efficiency scores generated during the efficiency analysis as the dependent variable for the subsequent regression analysis. The data analysis is therefore split into two parts, with *two dependent variables* – the first for the efficiency analysis and the second for the regression analysis.

Dependent variable for the efficiency analysis

Natural logarithm of household welfare (LNHW)

Household welfare is measured as the average household expenditure in thousands of Indian Rupees on the purchase of all consumption goods and services, including recreation, clothing, cosmetics, toiletries, home care products, rent, loan repayment installments, power, fuel, transport, communication, education, and health. We then take the natural logarithm of this number. This gives us a continuous measure that represents the natural logarithm of the amount of money that a family incurs toward their expenses. Higher values are associated with higher levels of welfare since they represent greater standards of living (Sahn & Stifel, 2003). Families that can incur more expenditure are, therefore, better off (Nilakantan et al., 2021).

Dependent variable for the regression analysis

Household welfare (HWE)

Household welfare efficiency is the efficiency with which households convert their endowments of labor, capital, and human capital into Household Welfare. As an efficiency score, HWE ranges between 0 and 1, with higher scores indicating higher levels of efficiency. A score of 0.2 indicates that a household has attained a Household Welfare level that is 20% of the maximum level that it could have attained had it made optimal use of its endowments of labor, financial capital, and human capital.

Independent variables for the efficiency analysis

Natural logarithm of the family size (Ln FAM)

This is the natural logarithm of the number of members in the household.

Natural logarithm of the age of the respondent (Ln Age)

This is the natural logarithm of the age of the head of the household in years.

Natural logarithm of the extent of exposure to formal financial inclusion (Ln AFI)

This is the natural logarithm of the number of sources of formal financial inclusion the household has access to. Sources include bank account, credit card # 1, credit card # 2, brokerage account, other investment account (e.g., retirement savings), and health insurance.

Natural logarithm of education (Ln AFI)

This is the natural logarithm of the education level of the head of the household. Education level is coded as 1 for no education, 2 for 1st to 12th grade, 3 for undergraduate degree, and 4 for postgraduate degree.

Independent and moderator variables for the regression analysis

Goods and Services Tax (GST)

This variable is a dummy variable taking the value 0 in the years 2015 through 2017 and 1 in the year 2018. GST came into force on July 1, 2017, and has remained in force since. Given that GST came into force in the latter half of 2017, we treat the entire year 2017 as part of the pre-GST period.

Social bottom of the pyramid (SBOP)

As we have discussed before, in the Indian context, belonging to the SBOP is often operationalized through *Caste*. Caste in the Indian context has a substantial effect on an individual's lifetime opportunities (Bapuji & Chrispal, 2020; Nafziger & Terrell, 1996), with members belonging to socially disadvantaged castes having reduced access to opportunities for economic advancement. We capture this effect with a binary dummy variable taking the value 1 if an individual belongs to a *"scheduled caste"* (the most disadvantaged in the hierarchy), and 0 if not. This categorization is congruent with the Governent of India's official guidelines regarding which castes constitute "Scheduled Castes and Tribes" (i.e., those considered socially backward).

Geographic bottom of the pyramid (GBOP)

Consistent with the view presented in prior logistics and SCM research (e.g., Iyengar et al., 2021; Nilakantan et al., 2019; Pal & Altay, 2019), we measure geographic BOP as being associated with the respondent living in a rural area. Rural areas in India are known to have substantial developmental challenges, including bad roads, lack of storage and distribution infrastructure, and so on, making them appropriate for GBOP (c.f., Nilakantan et al., 2021). Therefore, this variable is a dummy taking the value 1 if the respondent resides in a rural area, and 0 otherwise. The classification of whether a region is considered as rural or urban is based on 2011 Indian census data (CPHS, 2021).

Control variables for the regression analysis

In addition to the hypothesized variables, we also included additional control variables which are discussed below.

Religious minority (MIN)

This variable is a dummy variable taking the value 1 if the household belongs to a religious minority group, and 0 otherwise. Religious minority groups in India have non-Hindu religious affiliations, i.e., Buddhist, Sikh, Jain, Christian, Muslim, or Others. The average consumption of goods and services is lower for Muslim but higher for non-Muslim religious minorities than for Hindus in India (PTI, 2016). Therefore, membership of a minority group may have welfare efficiency effects for reasons other than reduced access to opportunities for economic advancement due to infrastructural or social backwardness.

State dummy variables

We introduce a vector of 27 dummy variables to capture the state of residence of the household (there are a total of 28 states in India, all of which are represented in our data). State level economic policies and general infrastructure availability vary widely and have clear household welfare effects that must be controlled for.

DATA ANALYSIS AND RESULTS

As discussed before, our sample consists of 214,407 observations on 74,415 distinct households sampled from across the country. Because not every household is present in the sample every year, the breakdown for the four years 2015, 2016, 2017, and 2018 is 51,387, 55,093, 56,828, and 51,099 households, respectively. Table 1 presents the variable operationalizations and descriptive statistics, while the correlation matrix is presented in Table 2.

Computing efficiency scores

Because H1 involves a measure of efficiency (i.e., household welfare efficiency), we need to first generate the efficiency scores. Therefore, as a first step, we perform a stochastic frontier analysis (SFA) to fit a *production frontier* and compute the efficiency of households

TABLE 1 Variable operationalization and summary statistics ($N = 214,407$).

Variable	Meaning	Label	Mean	SD
Household welfare efficiency	Efficiency score (ranges from 0 to 1)	HWE	0.04	0.02
Goods and Services Tax	Dummy variable for whether the Goods and services tax regime is in force (1 if yes, 0 if no)	GST	0.24	0.43
Social BOP	Dummy variable for whether the respondent belongs to the social bottom of the pyramid (1 if yes, 0 if no)	SBOP	0.07	0.26
Geographic BOP	Dummy variable for whether the respondent belongs to the geographic bottom of the pyramid (1 if yes, 0 if no)	GBOP	0.33	0.47
Minority	Dummy variable for whether the respondent belongs to a minority community (1 if yes, 0 if no)	MIN	0.14	0.34
Family size	Number of members in the respondent's family	FAM	4.06	1.58
Extent of exposure to formal financial inclusion	No of sources of financial inclusion to which the respondent has access. Sources include bank account, credit card # 1, credit card # 2, brokerage account, other investment account (e.g., retirement savings), and health insurance.	AFI	1.94	0.94
Age of the respondent	Age of the respondent (measured in years)	AGE	47.42	9.95
Education	Education level of the respondent (1 for no education, 2 for 1st to 12th grade, 3 for undergraduate degree and 4 for postgraduate degree)	EDU	2.01	0.54

TABLE 2 Pairwise correlation.

	HWE	GST	SBOP	GBOP	SGBOP	MIN	FAM	AFI	AGE	EDU
HWE	1.00									
GST	0.54*	1.00								
SBOP	0.03*	0.003*	1.00							
GBOP	−0.08*	0.02*	−0.20*	1.00						
MIN	0.07*	0.004*	−0.06*	−0.02*	−0.11*	1.00				
FAM	−0.08*	−0.02*	0.01*	0.04*	0.02*	0.06*	1.00			
AFI	0.09*	0.08*	−0.01*	−0.04*	−0.15*	−0.05*	−0.09*	1.00		
AGE	−0.48*	0.03*	−0.06*	0.09*	−0.01*	0.01*	−0.01*	0.01*	1.00	
EDU	0.05*	0.10*	−0.02*	−0.11*	−0.19*	−0.03*	−0.04*	0.24*	−0.11*	1.00

*$p < .05$.

relative to that frontier. The production frontier defines the maximum consumption of goods and services (household welfare) that can be attained given the labor, capital, and human capital endowments of the household. Efficiency relative to the production frontier is the ratio of actual consumption to potential maximum consumption under the frontier and, therefore, lies between 0 and 1. A value of 1 indicates that the household is efficient since potential and actual consumption coincide, whereas values less than 1 indicate that the household is not efficient since actual consumption falls short of potential consumption. Deviations from the frontier occur if actual consumption levels are lower than the potential maximum. These can occur due to inefficiency or random chance (statistical noise) – for example, a farmer's crop may fall short of the maximum possible because of unseasonal rains. This would be an example of a deviation from the frontier due to random chance and not the inefficiency of the farmer. SFA permits the disentangling of the efficiency from the noise components in assessing performance.

SFA also does not assume that each household is technically efficient, i.e., achieves the maximum consumption of goods and services that can be attained given their labor, capital, and human capital endowments (Greene, 2008). In the real world, it is rare for every decision-making unit under consideration, whether a firm or a household, to be technically efficient – the more reasonable assumption is that only some decision-making units are efficient, whereas others are not (Su et al., 2018). SFA makes this more reasonable assumption in its analysis of the relationship between inputs and outputs when determining efficiency.

An alternative approach to efficiency measurement is Data Envelopment Analysis (DEA). SFA has an advantage

over DEA in that it permits deviations from the frontier to be due to random noise as well as due to inefficiency, whereas DEA assumes that all deviations from the frontier are solely due to inefficiency, which is an assumption that is inappropriate in the rainfall example above (Theodoridis & Anwar, 2011). Given that several households in our sample are engaged in and around the agricultural sector (as is consistent with most agrarian societies such as the one from where our data is sourced) and prone to considerable statistical noise, the SFA treatment of deviations from the frontier is more appropriate. Further, given the large sample size in our present exercise (more than two hundred thousand households are considered simultaneously), SFA is preferred to DEA given that DEA suffers from the curse of dimensionality, with the problem being exacerbated both in problem size and the presence of multiple inputs and outputs, making use of the DEA technique inexpedient (Dellnitz, 2022).

We use the following SFA model of Lee and Schmidt (1993):

$$y_{it} = \alpha_t + X_{it}\beta + v_{it} - u_{it} = \alpha_{it} + X_{it}\beta + v_{it} \quad (1)$$

where i indexes households, t indexes time, y_{it} is the natural logarithm of household welfare, X_{it} are the natural logarithms of household labor, capital, and human capital endowments, v_{it} is statistical noise that is independently identically distributed with mean 0 and variance σ_v^2, and $u_{it} \geq 0$ is the inefficiency of household i at time t. We have $\alpha_{it} = \alpha_t - u_{it}$ being the intercept for firm i at time t, whereas α_t is the frontier intercept at time t, i.e., the maximum possible value of α_{it} (Lee & Schmidt, 1993). This model exploits the panel nature of the data set by permitting time varying inefficiency, i.e., households' welfare efficiency levels may vary over time. This is done by modeling $\alpha_{it} = \theta_t - \delta_i$ where θ_t are parameters to be estimated. The estimation model is, therefore:

$$y_{it} = X_{it}\beta + \theta_t\delta_i + v_{it} \quad (2)$$

The household's welfare efficiency level is then exp $(-u_{it})$, which lies between 0 and 1. Once the household welfare efficiency scores are obtained, they are regressed against the hypothesized X variable, moderator variables, their interactions, and the control variables in a hierarchical regression framework compatible with moderation analysis.

Subsequent analyses

We first fit the stochastic frontier analysis models for HWE (see Table 3) to generate the efficiency scores, which are subsequently regressed against other variables in Table 4. Note that the hypothesized dependent variable

TABLE 3 Stochastic frontier analysis results for household welfare efficiency (HWE) and FCE.

	Y var: Ln HWE		
Variable	**Coeff**	**SE**	***p* value**
Ln FAM	0.48***	0.01	.00
Ln AFI	0.07***	0.004	.00
Ln EDU	0.60***	0.01	.00
Ln AGE	2.11***	0.003	.00
Sigma *u*	0.40		
Sigma *v*	0.42		

Note: All regressions use robust standard errors.
*$p < .1$. **$p < .05$. ***$p < .01$.

Household Welfare (HWE) is an efficiency score, which ranges between 0 and 1, with a mass of households at 1. Therefore, following Huang and Liu (1994), we fit a truncated regression model, truncated above at 1, for HWE.

Since H1 through H4 propose a moderated model, we need to use hierarchical multiple regression following the multistep procedure recommended by Aguinis and Gottfredson (2010). As per this procedure, we need to first fit a controls-only model in which the dependent variable, i.e., HWE is regressed on the control variables. We then need to sequentially add the hypothesized independent variable (GST) and the hypothesized moderator variables (SBOP and GBOP) to capture the first-order paths. Next, we need to add the interaction variables (GST*SBOP and GST*GBOP) as the product of the first-order path variables. Finally, we need to add the three-way interaction term (GST*GBOP*SBOP) as well as the interaction between GBOP and SBOP (GBOP*SBOP). A statistically significant coefficient of the interaction variable indicates the presence of a moderation effect. At each stage, we also need to perform a Chi square test of whether the added terms increase the overall model fit. This gives us four models, i.e., controls-only (Model 1 in Table 4), controls plus hypothesized independent and moderator variables (Model 2 in Table 4), controls plus hypothesized independent and moderator variables plus the two-way interaction variables (Model 3 in Table 4), and finally, controls plus hypothesized independent, moderator variables, the two-way interaction variables, and the three-way interaction term (Model 4 in Table 4).

Explanatory validity tests

Overall model fit statistics, as well as comparisons between the models, are presented in Table 4. As can be seen, all models (Models 1 through 4 in Table 4) have statistically significant Chi-square statistics ($p < .01$ in

TABLE 4 Regression results for household welfare efficiency (HWE).

	Model 1 (controls) Y var: HWE			Model 2 (controls + X + W + Z) Y var: HWE		
Variable	**Coeff**	**SE**	***p* value**	**Coeff**	**SE**	***p* value**
GST	–	–	–	0.03***	0.0001	<.01
SBOP	–	–	–	−0.0003***	0.0001	<.01
GBOP	–	–	–	−0.01***	0.0001	<.01
GST*SBOP	–	–	–	–	–	–
GST*GBOP	–	–	–	–	–	–
SBOP*GBOP	–	–	–	–	–	–
GST*SBOP*GBOP	–	–	–	–	–	–
MIN	0.001***	0.0002	<.01	0.001***	0.0001	<.01
Constant	0.04***	0.0002	<.01	0.04***	0.0002	<.01
State fixed effects	Yes			Yes		
R square	.0729			.3814		
Chi square (df)	14,262.52 (26)			104,302.84 (29)		
p value	<.01			<.01		
Chi square difference (df) from preceding model	–			90,040.32 (3)		
p value	–			<.01		
Wald test Chi square (df) for added variables	–			84,318.16 (3)		
p value	–			<.01		

	Model 3 (controls + X + W + Z + XW + XZ) Y var: HWE			Model 4 (controls + X + W + Z + WZ + XW + XZ + XWZ) Y var: HWE		
Variable	**Coeff**	**SE**	***p* value**	**Coeff**	**SE**	***p* value**
GST	0.03***	0.0002	<.01	0.03***	0.0002	<0.01
SBOP	−0.001***	0.0001	<.01	−0.001***	0.0002	<0.01
GBOP	−0.01***	0.0001	<.01	−0.01***	0.0001	<0.01
GST*SBOP	−0.001***	0.0002	<.01	−0.0005	0.0004	0.24
GST*GBOP	−0.003***	0.0002	<.01	−0.003***	0.0002	<0.01
SBOP*GBOP	–	–	–	0.01***	0.0002	<0.01
GST*SBOP*GBOP	–	–	–	−0.001	0.0005	0.12
MIN	0.001***	0.0001	<.01	0.001***	0.0001	<0.01
Constant	0.04***	0.0002	<.01	0.04***	0.0002	<0.01
State fixed effects	Yes			Yes		
R square	.3821			.3821		
Chi square (df)	105,216.19 (31)			105,377.34 (33)		
p value	<.01			<.01		
Chi square difference (df) from preceding model	913.35 (2)			161.15 (2)		
p value	<.01			<.01		
Wald test Chi square (df) for added variables	199.31 (2)			15.24 (2)		
p value	<.01			<.01		

Note: All regressions use robust standard errors.

*$p < .1$. **$p < .05$. ***$p < .01$.

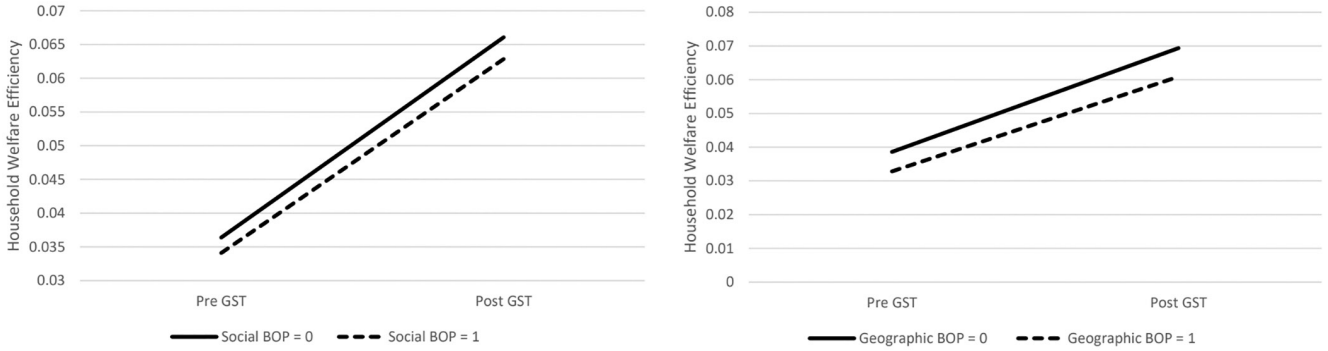

FIGURE 4 Moderating effect of social bottom of the pyramid (BOP), and geographic BOP on GST-HWE relationship.

all cases), indicating overall significance for all models. Table 4 shows statistically significant improvements in model fit (Chi-square difference) as the hypothesized moderator and independent variables ($p < .01$ for Model 2), the two-way interaction terms ($p < .01$ for Model 3), and the three-way interaction term ($p < .01$ for Model 4) are sequentially added (Table 4). Further, Wald tests show statistically significant improvements in model fit as the hypothesized moderator and independent variables ($p < .01$ for Model 2), and the interaction terms ($p < .01$ for Model 3, $p < .01$ for Model 4) are sequentially added (Table 4). The model fit improves as we move from Model 1 to Model 4. However, in Model 4, the primary objective is to test the combined interaction effect of GST, SBOP, and GBOP and we find that this three-way interaction (GST*SBOP*GBOP) is not significant. Hence, we focus on Model 3 to interpret the results of our hypotheses tests (Busenbark et al., 2021).

Hypotheses test results

The results in Table 4 (Model 3) show that the coefficient of the variable GST is positive and significant for HWE ($\beta = .03$, $p < .01$). This provides support for H1 and suggests that households experienced a significant increase in both welfare efficiency post GST, consistent with the guidance of TCU.

A look at the results for moderation of the relationship between GST and HWE by SBOP (Table 4 Model 3) shows that the coefficient of the interaction term between GST and SBOP is statistically insignificant ($\beta = -.001$, $p < .01$), thereby providing support for H2. This result is in-line with a negative moderating effect of SBOP, i.e., weakening of the positive relationship between GST and HWE. Households belonging to socially disadvantaged backgrounds therefore experience a smaller increase in household welfare efficiency post GST (change in household welfare efficiency = 0.0287), as compared to households that do not belong to socially disadvantaged backgrounds (change in household welfare efficiency = 0.0297). Average household welfare efficiency pre-GST for disadvantaged and non-disadvantaged households was, respectively, 0.0341 and 0.0364, so these represent 81.5% and 84.3% increases in household welfare efficiency, respectively (see Figure 4). Thus, while all households experienced an increase in household welfare efficiency post GST, households belonging to socially disadvantaged backgrounds attained a smaller increase in household welfare efficiency in both relative and absolute terms than households not belonging to socially disadvantaged backgrounds.

Further, a look at the results for moderation of the relationship between GST and HWE by GBOP (Table 4 Model 3) shows that the coefficient of the interaction term between GST and GBOP is negative and significant ($\beta = -.003$, $p < .01$), thereby providing support for H3. This result is consistent with a negative moderating effect of GBOP, i.e., weakening of the positive relationship between GST and HWE. Households belonging to geographically disadvantaged backgrounds therefore experience a smaller increase in household welfare efficiency post GST (change in household welfare efficiency = 0.0281), as compared to households that do not belong to geographically disadvantaged groups (change in household welfare efficiency = 0.0308). Average household welfare efficiency pre-GST for disadvantaged and non-disadvantaged households was respectively 0.0328 and 0.0386, so these represent 79.6% and 85.5% increases in household welfare efficiency respectively (see Figure 4). Thus, while all households experienced an increase in household welfare efficiency post GST, households belonging to geographically disadvantaged backgrounds attained a smaller increase in household welfare efficiency in both relative and absolute terms than households not belonging to geographically disadvantaged backgrounds.

Results for three-way moderation of the relationship between GST and HWE by SBOP and GBOP together (Table 4 Model 4) shows that the coefficient of the interaction term between GST and SBOP and GBOP

(GST*SBOP*GBOP) is insignificant ($\beta = -.001$, $p < .12$), thereby not providing support for H4. This indicates that the effects of SBOP and GBOP on the GST to HWE relationship operate independently of each other, and not in a three-way interactive fashion. Overall, therefore, our moderation results are consistent with the preponderance of our hypotheses, which proposed that socially and geographically marginalized communities would enjoy less benefit of GST, compared to non-marginalized communities. Taken together, these results are meaningful for SCM, especially from the dual lenses of transformative scholarship and public policy, which we discuss next.

DISCUSSION AND IMPLICATIONS

Our overall results demonstrated that while the welfare benefits of tariff reduction through GST were positive in terms of the resultant impact on welfare efficiency, they were less meaningful for those at the SBOP and for those at the GBOP. These results need to be placed in context for us to truly understand their implication. We discuss this below. However, for the purposes of flow, we discuss the implications for the statistically significant result of H3 *before* we do the statistically significant results of H1 and H2.

Implications for policy and practice

The driving force behind many of the demographic phenomena that society has witnessed over time, including wars, legal and illegal immigration, and urbanization, is the inability to meet one's needs satisfactorily or provide a sufficient quality of life where one is stationed. Looking back in history, entire cities and civilizations have been uprooted because people found that their geographic or social circumstances were deleteriously impacting their ability to provide for their families and loved ones. It is in this light that our first finding – which suggested that GST had more beneficial impacts for non-GBOP participants than it did for GBOP participants (i.e., H3) – has the most immediate implication.

Specifically, because GBOP refers to households that are rural, initiatives (like GST) that may unexpectedly benefit the non-GBOP more than it does the GBOP, may implicitly incentivize migratory tendencies among those at the GBOP if compensatory measures are not taken to ameliorate the challenges such initiatives raise (Lall et al., 2009). People can, after all, choose where they live. Indeed, researchers have continued to argue that internal migration (i.e., people moving from one part of the country to another) is a major problem in certain developing countries (c.f., Thompson & Walton-Roberts, 2019). Economic models have consistently suggested that such internal migration is often triggered by unexpected economic outcomes of government policies (c.f., the *Harris-Todaro Model of Growth*), and empirical evidence also backs up this guidance by suggesting that much of the migration in such cases continues to be unidirectional – i.e., from rural to urban areas. For example, according to the World Bank, in India, the rural–urban population split has changed from 82%–18% in 1960 to 65%–35% in 2019. Similarly, in the Philippines, the urban population has grown at an average rate of 3.3% from 2000 to 2010 indicating a shift from rural to urban (World Bank, 2017). Several other countries, including China, most Latin American countries, and most of sub-Saharan Africa, also show this trend (Selod & Shilpi, 2021).

Arguably, this creates a challenge for BOP supply chains, and more importantly, the ecosystem it supports (Lashitew et al., 2021). By their very nature, BOP supply chains are highly labor intensive (Iyengar et al., 2021; Oke et al., 2022; Sodhi & Knuckles, 2021). For example, Bendul et al. (2017) argue that local suppliers, labor-intensive local assembly, and local distributors are all inextricably linked in successful BOP supply chains. Similarly, Rosca et al. (2019) also discuss the importance of local micro distributors and local entrepreneurs in getting goods and services across to the BOP. Zomorrodi et al. (2019) also argue that larger upstream corporations need to adapt their downstream physical flows by partnering with local BOP businesses and setting up micro-production and distribution points to successfully get their goods to such (i.e., underserved BOP) markets. For example, in India, large national and multinational corporations such as *Reliance Retail* and *Amazon* have begun programs where they partner with small local retailers and invite them to sell through their online platforms. Even in the United States, reports have begun to emerge of giants like Amazon recruiting local mom-and-pop businesses to efficiently solve the last-mile logistics challenge (Del Rey, 2022). Culling of labor from such places on account of young, workforce-ready people moving away is, therefore, likely to call into question the availability of the very resource that large corporations may depend on, and may have begun investing in, to get their goods and services in the hands of buyers (e.g., Sodhi & Knuckles, 2021).

We contend, therefore, that from a policy standpoint, this calls for a closer examination of governmental policies in terms of the (unexpected) differential impact they may have at the GBOP, and how they may be ameliorated. A "level playing field" may not truly be level, and special considerations may need to potentially be carved out (at least temporarily) for those at the BOP within larger legislative actions, especially when said actions may fundamentally alter the nature of tariffs and markets. Some

societies may have been better at these than others in the past – for example the formation of the Eurozone, which was another such move towards tariff harmonization in trade, was directly coupled with massive farm and rural subsidies to help create a relatively level rural–urban playing field. However, at the current time, it appears that this realization is not automatic everywhere in the world – consider that in the case of the GST rollout that we have investigated here, there was, to the best of our knowledge, no special rural subsidy carveout unlike we had seen in the Eurozone.

A second practical implication of our study is even more sobering. Our study also suggests that social inequity (i.e., SBOP) and disadvantage represses households as compared to non-disadvantaged (i.e., non-SBOP) households even when similar policies are implemented for all. In the current study, we have operationalized SBOP as the caste of the household, with "Lower Castes" representing the disadvantaged group (c.f., Mosse, 2018). Munshi (2019) indicates that such social inequity between populations limits social and physical interaction between communities. Therefore, researchers indicate that merely *getting physical access* to services may be harder for such socially disadvantaged communities, especially in rural areas (Bapuji & Chrispal, 2020; Cameron, 1998; Fransoo et al., 2017). For example, examining the geographic makeup of BOP villages, Bapuji and Chrispal (2020, p. 537) argue that "the houses of (Upper Castes) would surround the temple and school, and were located at the center [*sic*] of the village.... (while the houses of the lower castes)... would be at the edge of the village, clustered according to their occupations... at a considerable distance." Because of such reasons of exclusion, those from lower castes may not be able to take full advantage of the available opportunities (c.f., Jagannathan et al., 2020; Munshi, 2019; Munshi & Rosenzweig, 2006).

It is, therefore, our contention that for development to be truly accelerated, we as a people, need to break the persistent cycles of social disadvantage that have been perpetuated by treating different groups of people as *unequal*. This may be true not only in our study setting (i.e., India) but everywhere else in the world where the ethically questionable practice of viewing certain groups and communities as "different" exists (c.f., Esper et al., 2020). This, therefore, calls for a truly transformative mindset from multiple stakeholders, including governments/policymakers, social reformers, and NGOs, in addition to the much-discussed intermediaries such as banking (e.g., Rao et al., 2019) and microfinance (e.g., Nilakantan et al., 2019) institutions. Public and private entities must – individually and collectively – focus on addressing infrastructural deficiencies when contending with the inequities faced by BOP populations.

Unfortunately, our results also suggest that even when public policy may be designed as equitable and unbiased, it may inadvertently end up (adversely) affecting the most vulnerable among us, and there may be a need for corrective actions to preemptively ameliorate the deleterious consequences that it is likely to cause. This calls for a transformative mindset not just toward research and scholarship but also in the way we create public policy, with the needs of the most vulnerable among us calling for special attention. If we are to draw inspiration from the guidance of Fawcett and Waller (2015, p. 1), who argued that the role of scholarship is to "advance knowledge and understanding for *the benefit of society*" [emphasis added], the scholarly and practitioner communities need to accommodate more of this transformative mindset in their work, deliberations, and actions.

Implications for research

From a theoretical perspective, we grounded our study and its hypotheses on guidance from two theoretical influences– i.e., TCU, with an application of MRT. A search of the *Journal of Business Logistics* revealed no papers that have applied TCU. At the same time, use of MRT is still relatively limited in mainstream SCM scholarship, despite gaining momentum. MRT is particularly applicable to supply chain problems given the significance of *context* (Craighead et al., 2016). General theories tend to explain "typical influences" on "average effects" across diverse contexts (e.g., time and place), yet can find limited applicability to distinct settings and circumstances (Goldsby & Zinn, 2019). The current research context provides one such setting/circumstance that calls for adaptation, or the inclusion of "profound mechanisms," to explain unique phenomena and predict outcomes (Dobrzykowski et al., 2023).

The focal context of this research accepts that taxation can influence the location of production facilities, distribution, and inventory, as well as introduce uncertainty that elevates risk concerns when engaging in strategic decision-making (Dong & Kouvelis, 2020; Zinn & Goldsby, 2020). Tariff harmonization, while expected to reduce the friction of trade through respective effects of trade diversion and creation, one is left to wonder the net welfare effects on vulnerable BOP populations for whom deregulation was designed to benefit. The research findings posit that something is lacking towards the achievement of desired outcomes. In MRT-speak, this is the *mechanism* by which context influences outcomes (Stank et al., 2017). We propose that lacking technology capabilities among rural and underserved populations may lend to the disconnect between trade

liberalization (GST) and enhanced welfare efficiency among those in SBOP and GBOP populations; hence, underscoring the vitality of causal mechanisms in rich contextual problems and spelling out boundary conditions on broad causal assertions.

Additionally, echoing the recent views in SCM scholarship (Darby et al., 2019; Pellathy et al., 2018; Stank et al., 2017), we propose that the application of MRT could pave the way to explore new supply chain phenomena. This is particularly true for policy research that is often highly context-specific, thereby presenting further opportunities for applications of MRT with a specific focus on welfare-oriented constructs. The presentation of MRT in the current research is critical, as it allows for the contextualization of TCU to the GST implementation in India and the microentrepreneurial ecosystem that operates within the nation, leading to an improved understanding of policy implications for those at the BOP.

Further, as the current research exhibits, even well-intentioned policy (Sathaye et al., 2010;) and business decisions (Carter et al., 2020) can foster unintended consequences. Such was the case of protectionist measures implemented by the Trump administration to reduce America's dependence on Chinese imports, beginning in 2018. As Rogers et al. (2024) uncover, the tariffs failed to reduce Chinese imports, but did elevate the cost of doing business in industries that the tariffs sought to protect, with much of this burden reflected in higher prices faced by American consumers. This is a general tendency that scholars have long recognized through the *Law of Unintended Consequences*.

However, some of the nuances of these consequences may be lost unless one investigates questions of relevance to such transformative research from a multi-disciplinary lens using grounding in MRT, such as we have done here. This is consistent with Makadok et al. (2018), who argue that "it would be extraordinarily rare for a theory developed at one level of analysis to apply equally well, without any adaptation, to a different level of analysis. Blindly applying an unaltered theory to a different level of analysis in this way may require inappropriate assumptions and/or generate implausible results. Nevertheless, with careful adaptation and appropriate adjustments, some elements of a theory at one level of analysis may be at least partly relevant at other levels of analysis, and these adaptations represent opportunities to contribute to theory. (p. 1535)" General theories that support contemporary best practices among mega-marts in the developed world would be challenged to find ready application to the rural kirana shop bound by different operational realities and customer expectations. We, therefore, contend that research that employs boundary-spanning premises and theory (of which MRT is an integral part), stands to benefit the multitude of interests and stakeholders that make up modern supply chain ecosystems, especially at the BOP (Kalkanci et al., 2019; Nilakantan et al., 2019; Sodhi & Knuckles, 2021; Van Wassenhove, 2019).

LIMITATIONS AND FUTURE RESEARCH

The current study has some limitations that need to be acknowledged. First, the data used in the current study come from a secondary source and were not necessarily collected for the purposes of the current analysis. Instead, the data are collected in a manner for broad application. This means that there is room for future research to tailor their investigations and data collection. Additionally, the data are anchored in one country (India), and future research may benefit by investigating similar questions in other countries. While BOP investigations based in India are common in the SCM literature (e.g., Iyengar et al., 2021; Rao et al., 2019; Sodhi & Tang, 2016; Tate et al., 2019), there are large BOP populations in many other countries that have not been investigated. We propose that future research should investigate these populations so that we can gain a holistic understanding of BOP SCM challenges and potential solutions, including in the context of such instances of tariff and cross-border commerce harmonization. Also, while we have only explored one policy intervention that had implementations for cross-border commerce, undoubtedly, other such interventions exist. While it is not possible for us to investigate those here, they are fertile topics for future research.

Summarily, our analysis sought to address the practical question as to whether the removal of trade restrictions (in the form of GST tariff harmonization) achieved its objectives. In colloquial terms, does a rising tide lift all boats? While, overall, GST and the removal of interstate tariffs were shown to be beneficial in our sample, they proved more so for wealthier households occupying positions further up the economic pyramid. Less wealthy households were elevated, on average, but to a lesser degree than their larger, wealthier counterparts. Our study went further to distinguish subsets of the population (SBOP and GBOP) that were less able to achieve the full benefit of the trade liberalization policy. The analysis and its formulation benefited from the influences of the burgeoning transformative research movement, with grounding in the supply chain and public policy literatures. The analysis also represents the adaptation of extant theory (TCU) through the middle-range theorizing to embody the distinctive contextual influences of the research problem and setting. We expect to see more research fuse these influences to yield a transformative problem-solving agenda,

tackling seemingly intractable problems that supply chain researchers and professionals are uniquely positioned to address.

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